ORIGINAL

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Petition of STARSYS, Inc. for	)	RM-
Amendment of Section 2.106 of	)	
the Commission's Rules to	)	
Allocate Spectrum For, and	)	
to Establish Other Rules and	)	
Policies Pertaining to, a	)	
Low Earth Orbit Mobile	)	
Satellite Service	)	

RECEIVED

MAY 4 1990

Federal Communications Commission
Office of the Secretary

PETITION FOR RULE MAKING

STARSYS, Inc. ("STARSYS"), by its attorneys and pursuant to Section 1.401 of the Commission's rules, hereby petitions the Commission to amend Section 2.106 of its rules, 47 C.F.R. § 2.106, to allow STARSYS to implement a new spread spectrum low earth orbit ("LEO") mobile satellite services ("MSS") communications service that will be capable of providing universal, two-way communications and position determination services.

Affiliates of STARSYS, including North American CLS, Inc. ("NACLS") which operates the Argos LEO system, have provided the scientific community with cutting-edge LEO MSS services for over 11 years. With recent advances in technology and a consumer and business population that is starved for low-cost, reliable mobile communications capabilities, STARSYS is convinced that the time has arrived for the implementation of a commercial LEO MSS system. To this end, STARSYS is, concurrently with this petition for rule making, applying to

the Commission for authority to construct a multi-space segment component spread spectrum LEO MSS system. (A copy of the STARSYS application is attached hereto as Appendix A.)

As explained in the STARSYS application and in this petition, Commission adoption of the STARSYS petition will advance the public interest in a variety of ways. In order that STARSYS may proceed promptly towards the realization of these benefits, it hereby requests expeditious consideration of the instant petition and the attached application. Further, STARSYS claims a "pioneer's preference" of the variety currently under consideration in proposed Section 1.402 of the Commission's rules.[1/]

I. STARSYS Service Description

As is fully explained in the attached application, STARSYS proposes to construct, and eventually to launch and operate, a revolutionary spread spectrum system consisting of 24 spacecraft placed in an inclined, low earth, non-geostationary orbit approximately 1,300 kilometers above the earth. The name of this system is "STARNET." The STARNET

1/ See Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services, FCC 90-141, slip op. at 4-5 (released April 27, 1990). STARSYS intends to file comments in response to the Commission's "pioneer's preference" rulemaking proceeding advocating the retroactive application of the pioneer's preference to rulemaking petitions filed after the release date of the notice of proposed rule making.

component spacecraft will weigh approximately 112 kg (246 lbs.) each, and have a minimum useful life of five years.

The STARNET system will be capable of providing 24-hour, 2-way communications and position determination services on a global basis. These services will be provided via ultra-low-cost, portable transceivers that will retail for less than $75 per unit. Primary and back-up control centers in the United States will interconnect with the global telecommunications network via standard interfaces, including X.25.

NACLS, an affiliate of STARSYS, has more experience than any other American organization in the design and construction of LEO mobile satellite payloads. Since 1979, NACLS has constructed 14 (and operated 7) low earth orbit mobile satellite payloads. These spacecraft have operated with a reliability factor that exceeds 99 percent. STARSYS intends to apply NACLS's technical experience, and improve upon it, to ensure that the highest quality LEO satellite technology is made available to the United States and the world.

The STARNET system requires the use of the spread spectrum technique, making it the most spectrum-efficient satellite system ever proposed to the FCC.[2/] The frequencies

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2/ The specific frequencies requested are:

- Shared use with competing LEO MSS systems of 1 MHz at 137-138 MHz and 1 MHz at 148-149 MHz;

(Footnote continued on next page)

requested for reallocation in this petition are currently allocated (both domestically and internationally) for satellite services. However, the specific LEO MSS service proposed by STARSYS is not presently authorized for this band.

The STARNET user segment will consist of millions of ultra-low-cost terminals operating at VHF frequencies. These terminals will transmit to the STARNET system components at 4,800 bps over ten 18 KHz channels at 1-watt for portable and 1-watt for mobile terminals. Subscribers will be able to send messages of up to 32 alphanumeric characters. These same terminals will be able to receive messages from the STARNET system components at 4,800 bps over ten 18 KHz channels. The unprecedented low power required for communication via the STARNET system will enable STARSYS to arrange for the mass production of user terminals -- terminals that include two-way communications in positioning, digital speech synthesis, thermal micro-printers, power-saver circuitry for long life, and VLSI logic circuitry -- for less than $75 per unit. This makes the STARNET user terminals available to the public at

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(Footnote continued from previous page)

2/

or, if STARNET is required to operate on a non-spread spectrum basis:

- 370 KHz in the 137-138 MHz band for space-to-earth transmissions;
- 478 KHz in the 148-149 MHz band for earth-to-space links.

1/15th of the price of the current lowest cost satellite access equipment.[3/]

The services to be offered on the STARNET system include the following:

- Two-way messaging from $75 calculator-sized terminals;
- Interconnection with the public-switched telephone network;
- Position determination anywhere in the world;
- Emergency alert services, for safety of life or property;
- Environmental monitoring services, to detect and reduce pollution;
- Mobile property and construction equipment management services, for anti-theft purposes;
- Automatic vehicle pollutant emission level monitoring;
- Electronic license plate functions for intelligent vehicle-highway systems;
- Biosensor monitoring for telemedicine applications;
- Home remote control; and
- Judicial system locating service.

STARSYS projects that approximately 10 percent of the U.S. population, some 25 million people, will subscribe to one or

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3/ The current low-cost leader in satellite services is NACLS's affiliate -- CLS Argos -- with terminal equipment costing approximately $1,000 per unit.

more of the above-listed pioneering mobile satellite services. STARSYS has tailored its service offerings to meet the needs of the public in the 1990s and beyond, and proposes to offer its capabilities on a private, non-common carrier basis to organizations with regular business operations in various market segments (e.g., automotive, health care, recreational equipment, mobile communications, and environmental protection industries).

Capacity on the STARNET system will be sold to organizations in Million Transmission ("MT") units. The end-user sales organizations will then be free to market the STARNET capacity to final customers in whichever manner they believe to be best. STARNET's market research indicates a total demand for its services of approximately 100 MT units per year, with 40 percent of the demand coming from the automotive industry, 20 percent from health care, 15 percent each from recreational equipment and mobile communications, and 10 percent from environmental protection industries.

II. The Allocation Of Spectrum For The Establishment Of An LEO MSS System Will Advance The Public Interest.

There is no doubt that the STARNET system will serve the public interest in a variety of different and important ways. The STARNET system will save lives, protect property, help safeguard the environment, and provide a supplemental solution to the problem of prison overcrowding. The STARNET system will also improve the efficiency of a number of sectors

of the business economy, particularly the transportation sector, thereby enhancing American effectiveness and competitiveness in the global economy. STARSYS will also serve the national interest in developing a free and open global market in telecommunications services, furthering in the process the Commission's longstanding objective of multiple entry into new satellite technologies.

The LEO MSS service, as provided by STARSYS affiliate NACLS, has already demonstrated its ability to serve the public interest by saving lives, safeguarding property, and helping with environmental monitoring and protection efforts. The STARNET system proposed in the attached application, through its pioneering application of spread spectrum communications technology to the LEO MSS service, will enable these service benefits, and numerous others -- both as contemplated by STARSYS and as yet unimagined -- to be made available to millions of users.

Not only is STARSYS's spread spectrum technology considerably more spectrum-efficient than any other technology that has been proposed to date for LEO MSS, it is entirely consistent with the Commission's longstanding objective of achieving competitive multiple entry for emerging satellite

technologies.[4/] In the past, when the Commission has been faced with a decision between allocating spectrum for a service that will employ spread spectrum technology and allocating spectrum for a less efficient proposal that would reduce the capacity available for competing systems, the Commission has found that the utilization of spread spectrum technology that fosters competitive multiple entry is most consistent with the public interest. See RDSS Order, supra, 104 F.C.C.2d at 660-663. In fact, the primary motivation behind the Commission's decision to authorize spread spectrum proposals was the inherent opportunity for establishment of competitive multiple entry. Id. at 661.[5/] STARSYS urges the Commission to conclude here, as it did in the RDSS Order, that the benefits of spread spectrum technology require their application to LEO MSS service proposals.

As explained in the attached STARSYS application, STARSYS is proposing that the LEO MSS service be provided on a "Modified Primary" basis. This means that STARNET users would

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4/ See, e.g., Domestic Communications Satellite Facilities, 22 F.C.C.2d 86 (1970); 35 F.C.C.2d 844, recon. in part, 38 F.C.C.2d 665 (1972). See also Establishment of Satellite Systems Providing International Communications, 101 F.C.C.2d 1046 (1985); Amendment to the Commission's Rules to Allocate Spectrum For, and to Establish Other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, 104 F.C.C.2d 650 (1986) ("RDSS Order").

5/ In the RDSS Order, the Commission did provide applicants proposing uses of technology that were less efficient than spread spectrum uses an opportunity to amend their system proposals to incorporate spread spectrum design. RDSS Order, supra, 104 F.C.C.2d at 662.

be protected against subsequent LEO MSS system users in the requested frequency bands, but that STARSYS would be unable to complain of any interference from existing users in these same frequency bands.[6/] The frequency bands STARSYS proposes to use represent currently underutilized portions of the VHF and UHF frequency bands that are particularly well suited to the LEO MSS use proposed by STARSYS. They will enable the achievement of maximum capacity while minimizing the amount of power needed to communicate with the STARNET system component spacecraft.[7/]

Finally, STARSYS requests the Commission to utilize the parallel rulemaking and licensing proceeding approach in connection with LEO MSS services, in order to expedite the introduction of this new technology and service to the public, and to ensure that any rules and policies adopted by the Commission reflect concrete proposals for these innovative systems. See RDSS Order, supra, 104 F.C.C.2d at 252. See also National Association of Broadcasters v. FCC, 740 F.2d 1190 (D.C. Cir. 1984) (direct broadcast applications considered concurrently with rule making proceeding). The public interest

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6/ A detailed interference analysis is included in the attached STARSYS system application. In a nutshell, this analysis demonstrates that the STARSYS system will be compatible with existing users in the proposed frequency bands, and will not cause harmful interference.

7/ The low radiated power of the STARNET user terminal transmitter (approximately 1 watt), combined with the short-pulse nature of the signals and the spread spectrum modulation, will permit STARSYS to avoid interference with existing Fixed and Mobile Services.

will be greatly served by the simultaneous consideration of the pioneering STARNET system application (which relies on relatively low cost, light weight spacecraft that will serve an unprecedented number of concurrent users) and the instant petition for the initiation of a rulemaking proceeding to allocate spectrum and establish rules to govern the new LEO MSS service.

CONCLUSION

The STARNET system, operating at the frequencies requested herein, represents a novel and efficient use of spectrum. The utilization of an LEO MSS system to provide two-way communications and position determining capability on a global basis, at extremely low cost, will further important public and national interests. Accordingly, STARSYS requests the Commission to issue a notice of proposed rule making to adopt the frequency allocations requested herein, and to accept for filing and process the attached STARSYS system application that is being filed separately on this date.

Respectfully submitted,

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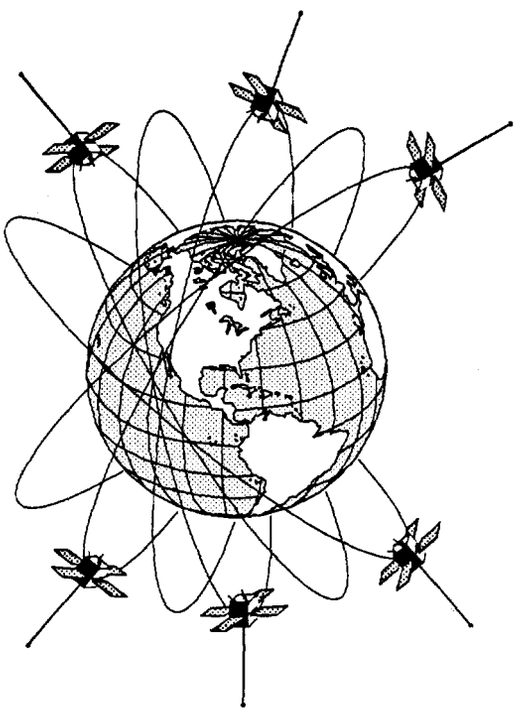
May 4, 1990

Its Attorneys

ATTACHMENT

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

APPLICATION
of
STARSYS, INC.



For a
LOW EARTH ORBIT (LEO) SATELLITE SYSTEM

"STARNET"

May 4, 1990

Volume I

EXECUTIVE SUMMARY

This Application seeks Commission approval for the leading provider of low earth orbit ("LEO") mobile satellite services ("MSS") communications to implement a new ultra-low-cost system to benefit millions of Americans. STARSYS, Inc. ("Applicant") is an affiliate of North American CLS, Inc., ("NACLS"). NACLS has provided cutting-edge LEO MSS to the scientific community for over eleven years. Applicant has now engineered a pioneering new commercial LEO MSS system, STARNET. The STARNET system will save many lives, assist individuals confronted with dangerous or frightening situations, better protect property and enhance the U.S. economy.

Applicant's affiliates have experience with over 13,000 user terminals of the currently-existing LEO MSS system called "ARGOS". Applicant built on this unmatched platform of experience to design its mass market STARNET system. No other system has the potential to serve as many mobile users, with such ultra-low-cost terminals, from as expansive a basis of experience in successfully implementing LEO MSS technology.

Applicant and its affiliates have been the true leaders of LEO MSS technology for over a decade. With prompt FCC approval for this Application, the fruits of these pioneering efforts can now be enjoyed directly by millions of American families and businesses.

THE STARNET SYSTEM

Applicant proposes to construct, launch and operate a pioneering STARNET system of 24 satellites placed in circular orbits approximately 1,300 kilometers above the earth. The system will be capable of providing 24-hour two-way communications and position determination service everywhere in the world. Service will be provided through ultra low-cost, portable transceivers, expected to cost about $75. Primary and back-up Processing, Analysis and Control Centers (PACCs) in the United States will interconnect with the global telecommunications network via standard interfaces (including X.25).

STARNET SPACE SEGMENT

The STARNET system consists of leading edge space, control and user segment technology. The space segment includes 24 satellites which are distributed randomly on 50 to 60 degree inclined planes in circular orbits at 1300 Km. The satellites will be designed for high reliability and five-year life. A capacity of between ten and twenty million subscribers can be comfortably handled with the STARNET system design.

Applicant and its affiliates have more experience than any other organization in the design and construction of low earth orbit mobile satellite payloads. Since 1979, Applicant's affiliates have constructed 14 and operated 7 low earth orbit mobile satellite payloads. These spacecraft have operated with a reliability exceeding 99%. Applicant intends to apply this experience to ensure the highest quality LEO satellite technology is made available to the American public.

The STARNET space segment can be constructed and launched by any of several qualified suppliers. Over a dozen firms have LEO satellite construction capability, and several companies offer LEO launch services. See, e.g., Appendix 5 for letter of MicroSat Launch Systems, Inc.

STARNET USER SEGMENT

The STARNET user segment consists of millions of ultra-low-cost terminals operating at VHF frequencies. These portable and mobile terminals will transmit to the satellites at 4,800 bps over 10 - 18 KHz channels using only 1 Watt. Subscribers will be able to send messages of up to 32 characters. These same terminals will be able to receive messages from the satellites at 9,600 bps over 4 - 30 KHz channels.

Applicant's affiliates have more experience than any other company in the world in the field of low earth orbit mobile satellite terminals. To date, Applicant's affiliates have provided service to over 13,000 terminals in a wide variety of scientific and specialized uses. With the Commission's approval of this application, the vast Argos experience with low earth orbit mobile terminals can benefit millions of Americans directly.

CONTROL SEGMENT

The STARNET LEO satellites will communicate with regional earth stations to interconnect various system users, to make position determinations, and to control space segment operations. The regional earth stations will be linked in a hub-type network to the major data processing center.

Applicant's affiliates have substantial experience in the operation of LEO satellite receiving earth stations. To date, and in cooperation with the U.S. Government, two (2) global recorded data receiving stations are in place at Wallops Island, Virginia, and Fairbanks, Alaska, and in cooperation with the French government, another one (1) is operated in Lannion, France. In addition to these three (3) global stations which also capture regional data, a regional earth station was established in Melbourne, Australia, with another to be established in Tokyo, Japan this year. In fact, within the private and public sectors there are more than a thousand S-Band, L-Band, and VHF receiving

stations operating globally, which provides the opportunity to establish "hand-shake" data acquisition arrangements. Applicant intends to apply its considerable national contact point knowledge and expertise to ensure the American public has access to, and enjoys, the highest quality and most cost-effective array of LEO mobile satellite services.

STARNET SERVICE CAPABILITIES

The two-way communications and ultra low-cost positioning capabilities of the STARNET system are unmatched by any technology developed to date. STARNET's array of services includes:

- two-way messaging from $75 calculator-size terminals;
- interconnection with the public switched telephone network;
- position determination anywhere in the world;
- emergency alert services, for safety of life or property;
- environmental monitoring services, to reduce pollution;
- mobile property and construction equipment management services, for anti-theft purposes;
- automatic vehicle pollutant emission level monitoring;
- electronic license plate functions for intelligent vehicle-highway systems;
- bio-sensor monitoring for telemedicine applications;
- home remote control; and
- judicial system locating service.

Applicant projects that approximately 10% of the U.S. population, about 25,000,000 people, will subscribe to the above array of pioneering mobile satellite services. Applicant has tailored its STARNET services to meet the needs of the American in the 1990s and beyond. These needs fall into three key areas:

- Safety-of-Life
- Protection of the Environment
- Economic Efficiency

STARNET services directed at bio-sensor monitoring and rescue applications directly address the safety-of-life market. As our population continues to mature, and the bio-electronics field continues to mushroom, needs for telemedicine links are projected to skyrocket. The unique STARNET system will enable remote monitoring of all kinds of bio-sensors so that the infirm need not be precluded from an outdoor lifestyle. With regard to rescue applications, STARNET predecessor technology already has saved lives, even with severe commercial usage restrictions. With these restrictions removed for the commercial STARNET system, it is certain that many more lives can be saved among outdoors enthusiasts, motorists, and the general public.

STARNET services aimed at environmental protection include emission monitoring and ambient air and water quality monitoring. The STARNET system has been designed to have the capacity to monitor the emission levels of each of the estimated two (2) million industrial vehicles in the United States. When pollution control equipment is not working properly, a radio message would be sent via STARNET to the vehicle's owner. It would also be possible, subject to applicable legislator and regulatory constraints, to arrange for a copy of the radio message to be sent to the local Department of Motor Vehicles. STARNET terminals are so inexpensive that they can be located throughout the USA's more populated regions. By attaching pollutant measurement sensors to a STARNET terminal, a satellite message can be sent whenever the sensor reports excessive levels of the pollutant.

STARNET services directed at economic efficiency include two-way messaging, anywhere around the globe, via a calculator-size terminal that sells for under $75. Savings, in terms of unnecessary car trips, missed appointments and the like, translate into many billions of dollars on a national scale. Transportation costs are one of the major cost factors in any product. The STARNET system will help reduce these costs by minimizing out-of-route miles and long waits at telephone booths. By creating several billion dollars worth of economic efficiency, the STARNET system will make America more competitive in the tough global markets of the 1990s and beyond.

THE MARKETS

Applicant proposes to offer its capabilities on a private, non-common-carrier basis to organizations with regular business operations in various market segments. Applicant believes that with its particular service mix, entries into service as a private satellite operator will be more effective than common carrier operations in meeting STARNET's anticipated market demand.

The immediate market for STARNET consists of those organizations that provide products or services in the automotive, health care, recreational equipment, mobile communications and environmental protection industries. Capacity on the STARNET system will be sold to such organizations in Million Transmission (MT) units. These end-user sales organizations will then be free to market the STARNET capacity to final customers in whichever manner they believe to be best.

Applicant's market research indicates a total demand for its services of approximately 100 Million Transmission units per year. This demand is divided among the automotive (40%), health care (20%), recreational equipment (15%), mobile communications (15%), and environmental protection (10%) industries. Sales prices for MT units must be individually negotiated due to the unique type of service different markets require (e.g. mostly messaging; mostly positioning).

Several of the STARNET markets are inconsistent with monthly subscription-type fees. These markets are geared to one-time, product-type purchases. Unlike other satellite systems and proposals, the STARNET private non-common carrier offerings will enable product manufacturers to build-in communications service capabilities without the necessity of burdening the consumer with a recurring subscription charge.

REQUESTED FREQUENCY BANDS

The STARNET system requires the use of the spread-spectrum technique requiring twice one megahertz of bandwidth, but making it the most

spectrum-efficient satellite system ever proposed to the FCC. Specific frequencies requested are:

- 137 - 138 MHz and 1 MHz at 149 - 149 MHz, shared use with competing other LEO MSS systems of 1 MHz;

or on a non spread-spectrum basis

- 509 KHz in the 137 - 137.509 MHz band for Space-to-Earth transmissions;
- 411 KHz in the 148.0 - 148.411 MHz band for Earth-to-Space links.

The frequencies needed by the STARNET system are allocated domestically and internationally for satellite services. However, the specific LEO MSS service proposed by Applicant is not specified for this band. Accordingly, Applicant is also filing today a Petition for Rulemaking to establish a Private Low Earth Orbit Spread Spectrum Mobile Satellite Service in the above-identified frequency bands.

Applicant's affiliates have substantial experience with LEO MSS propagation characteristics. This experience has been gained due to a decade of operations at the 401.650 MHz frequency bands employed by Applicant's affiliates. Based on this experience, Applicant is certain that the requested frequencies are the best choice for the STARNET service. Frequencies below those requested herein will suffer serious propagation, reliability and availability constraints. Frequencies much above those requested will result in severe cost penalties that undermine the mass market nature of the STARNET service.

Applicant believes the best approach for the Commission is to authorize the STARNET system on a "Modified Primary" basis in the U.S. This means that STARNET users will be protected against any subsequent users in these frequencies. Modified Primary status will also require that Applicant not complain of any interference from existing users in these bands. The spectrum and modulation techniques used in the STARNET system have been carefully engineered not to cause any harmful

interference to the relatively few NASA, NOAA, military mobile radio and non-government users in these bands.

The STARNET system is the most spectrum-efficient mobile satellite service ever proposed to the Federal Communications Commission. Over 100 million users can be equipped with satellite radios that will operate without interfering with other users in the same bandwidth.

APPLICANT'S READINESS TO PROCEED

Applicant's affiliates are the world's most experienced operators of low earth orbit mobile satellite systems. These organizations have spent tens of millions of dollars and thousands of man-years developing the technology being proposed to the Commission today. Applicant is ready, willing and able to commence construction of its STARNET system promptly upon receipt of the requisite approval.

Applicant has expended great energy and funds on the development of a detailed market model for its STARNET system. Automotive, health care, environmental, recreational, and other markets have been investigated with both empirical studies and real-world operating technology. No other company in the world has performed as much LEO MSS market trial research as have Applicant and its affiliates.

To demonstrate its commitment, Applicant is also filing, concurrent with this application, a request for a waiver of the construction permit requirement of sector 319(d) of the Communications Act of 1934, to start detailed design and preliminary construction by June 1990. Promptly upon Commission waiver of the applicable section 319(d) requirements, Applicant will invest substantial engineering time and resources, wholly at its own risk, in the development of the STARNET system.

THE PUBLIC INTEREST

The proposed STARNET system is the fastest, most cost-effective, and most technologically efficient way for the American public to benefit from LEO MSS technology. Insofar as LEO MSS technology directly serves the public interest in safety of life, protection of property and economic growth, it follows that the public interest strongly favors grant of this Application.

The STARNET system can most expeditiously advance the public interest benefits of enhanced U.S. safety and economic growth because:

- The Applicant is fully "up-to-speed" on LEO MSS technology, given that its affiliates have been successfully operating LEO MSS satellites for eleven (11) years;

- The Applicant's affiliates are the world's leaders in LEO MSS services, pioneering the application of these services to safety of life, environmental protection, outdoor recreation, protection of property, mobile communications, and scientific research;

- The Applicant's affiliates are the world's leader in low-cost satellite terminal manufacturing management. Applicant's associated manufacturers produce user terminals, with retail sales prices below $1000, which are already the world's least expensive satellite communications terminals.

- Applicant's affiliates have a decade-long track record of meeting on schedule all of their undertakings to develop LEO payloads, launch them on approved U.S. launch vehicles, operate ground control centers reliably a round-the-clock, and make available via multiple manufacturers a diverse array of user equipment for various applications.

Due to these outstanding qualifications, the public will be most assured of getting the best available LEO MSS technology, in the shortest possible

time, if the STARNET application herein is approved by the Federal Communications Commission. Once STARNET is implemented, American industry can become more globally competitive and American lives can be made safer. This is the very essence of the public interest that Applicant's STARNET system seeks to serve.

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